RX14-12

Attachment 1 – Research Topic Template

1. **Research Title:** Integrated Modeling and Experimental Approach for Validation of Multiaxial Constitutive Behavior of Engine Disk Metals

2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Mechanical Engineering or Engineering Mechanics (Ph.D. level)

4. **Objectives:** Develop algorithms and software to interactively characterize metallic specimen performance and to validate analytical plasticity models under multiaxial loading histories.

5. **Description:** Analytical models of plastic deformation in metals are typically based on measurements performed for simple states of stress, namely pure tension/compression or, occasionally, pure shear. However, the simplicity of the test conditions tends to limit the accuracy of the resulting model when applied to more complex loading states typically seen in components. The U.S. Air Force has developed experimental capabilities for testing material specimens under multiaxial loading conditions (tension or compression, combined with torsion). Also, recent developments in software integration provide methods for active control of experiments by software on desktop computers that communicate with advanced mechanical testing hardware. The focus of this effort would be on the development of software and methods for using this unique combination of test control capability to interrogate specimens under complex loading, and use these results to validate analytical material models for realistic multiaxial stress states.

6. **Research Classification/Restrictions:** US citizenship required.

7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided.

■ DAGSI (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati)
PA Approval #: 88ABW-2013-3310

☐ AFIT (only)

☐ USAFA (only)
If you are submitting a topic for the USAFA, please indicate if you are also interested in sponsoring a USAF Cadet in summer of 2013 **(Avg Cost for USAF Cadet for 33 days was $5000)**
☐ Yes No ☐